

ISO TC184/SC4/WG3 N1064

Validation Report

for

ISO/IS 10303-232

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prepare by Glen Ziolko

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Acronyms

AIM	Application Interpreted Model
AP	Application Protocol
ARM	Application Reference Model
ATS	Abstract Test Suite
CC	Conformance Class
CD	Committee Draft
DCAC	Define and Control Airplane Configuration
DDE	Data Definition Exchange
DIS	Draft International Standard
IDL	Indentured Data List
ISS	Integrated Support Systems
MIL	Military
NIST	National Institute of Standards and Technology
PAS-C	PDES Application Protocol Suite for Composites
PDM	Product Data Management
PL	Parts List
SEDS	SC4 Enhancement and Discrepancy System
SOLIS	SC4 On-Line Information Services
STAMP	Supply-chain Technologies for Affordable Missile Products
STD	Standard
STIR	STEP TDP Interoperability Readiness
TDP	Technical Data Package
UoF	Unit of Functionality
URL	Universal Reference Locator
US	United States

1 Introduction

This is a validation report for the STEP Technical Data Packaging Core Information and Exchange application protocol, AP 232. The report provides a summary of validation steps taken from the development of the requirements through the validation of the document itself at a International Standards (IS) level. A formal issue log, SC4/WG3/N1065, and the Internal review checklist, SC4/WG3/N1059, for ISO/IS 10303-232 are available on the SOLIS ftp server. The technical and editorial issues identified in these issue logs have been addressed. Therefore the AP 232 document is ready for publication as an International Standard.

The need to provide product information accountability (example - part, document and file) for the exchange process has been always an industry need. AP 232 Technical Data Packaging Core Information and Exchange addresses this void. Evidence of this comes from specific industries and government agencies using there own special processes and methods to accomplish product information accountability. Some examples of these special processes are the US Military Standard MIL-STD-1840, and the German ODETTE standard ENGDAT. AP 232 satisfies the requirements of these standards and creates a comprehensive single international standard that an enterprise can use across different customer and supplier bases. Requirement walkthroughs have been made in many countries, through ISO meetings, industry, and government forums. Positive feedback has been the norm for the need of the AP 232 standard.

2 AP Validation Plan

The validation plan consisted of many steps as documented in this validation report. The basic plan was the following.

- validate scope and requirements:

- Model walk-throughs at industry and international ISO meetings

- Industry Expert Workshop - 1994 Vought Aircraft, Dallas, Texas

- (ARM walk through - June 1995 Washington D.C., ISO meeting

- October 1995 Grenoble, France, ISO meeting

- June 1996 Kobe, Japan, ISO meeting

- June 1997 San Diego, ISO meeting

- January 1999 San Francisco, ISO meeting

- February 2000 Melbourne, ISO meeting & Australian Ministry of Defense Meeting.

- Comparison with other standards -

- US MIL-STD-2549 - Jan 1996 Dallas & Oct 1996 Toronto, Canada ISO meetings

- US MIL-STD-1840 - Oct 1996 Toronto, Canada ISO meeting

- ODETTE ENGDAT - October 1995 Grenoble, France ISO meeting

- ISO Standards Handbook 12

Sample populations of ARM

Parts List - Vought Aircraft Company expert (January 1996. in annex B)
Indentured Data List - General Dynamic, Fort Worth Texas expert, Jan 1996.
Exchange Management - French Missile Industry, 1999-2000
(Implemented the ARM with production software)

- validate interpretation and AIM

Using integrated resource model experts
mapping expert used - Mitch Gilbert, Greg Paul, Floyd Ganus, Glen Ziolk

Harmonization with other AP with similar information requirements

mapping document as product decision - March 1997, Chester, England, ISO meeting, July 1997 Gaithersburg, MD, WG12 meeting
harmonized document file properties - March 1998 Detroit, MI AP214 workshop
DIS ballot resolution workshop - June 2001, San Francisco, ISO meeting

Developing formal test cases

ATS 332 under development for conformance classes, Data definition exchange, Parts List, and Indentured Data List. (Boeing and Lockheed Martin are creating)

Software implementations

U.S. Air Force PAS-C program demonstration - June 1996
Participates - SCRA, Lockheed Martin, Northrop Grumman, Integrated Support Systems (ISS), Integration Technology Incorporated (ITI)
U.S. Government RAMP program - 1997-1998
Participates - Raytheon, Integrated Support Systems, International Technogroup Inc.(ITI), SCRA.
PDES Inc. STIR/STEPwise pilot - 1998-2000
Participates - Lockheed Martin, Northrop Grumman, IDA Inc., ISS. 10 part manufacturing suppliers.
Boeing Commercial DCAC program 1999-2001
Participates - Japan Aerospace Industry (JAI), Boeing, Northrop Grumman, ISS
French Missile Industry Baracha system - 1999 - 2001
Participates - ESPI Concept, CNES, Alcatel Space

3 Usage Scenarios and Usage Tests

Usage Scenarios for AP 232 can be found in Annex K of the AP document. Usage Tests can be found in the ATS 10303-332 for Parts List and Indentured Data List. Other Usage Tests are currently under development at the creation time of this Validation Report. The Usage Scenarios in the AP 232 document break down the major conformance classes (DDE, PL, IDL, DL, IL) into incremental capability usages. The usage tests in the ATS will provide usage test for five conformance classes. The five conformance class are the following:

- Data Definition Exchange (simple list of files),
- Data Definition Exchange (list of documents and their associated files),
- Data Definition Exchange (part structure with associated documents and files),
- Parts List,

- Indentured Data List.

4 Scope and Requirements Evaluation

The initial scope and requirements evaluation was done through a US government and industry team, lead by Mark Palmer at NIST. This team provide scoping requirements based on the US government desire to migrate from their internal standards to international industry standards. Experts from different branches of the US government (Army, Navy, Air Force, Commerce Department participated on this team.. Example of their specification they desired to replace were MIL-STD_1840, ANSI Y14.26, and MIL-STD-100. Additional evaluation of scoping came from a US.Air Force Manufacturing and Technologies program called PDES Application Protocol Suite for Composites. (PAS-C).The PAS-C program held scoping and requirement reviews that included US government and industry experts. A list of the organizations that participate were

US industry:	Texas Instruments
	Boeing Aircraft
	General Dynamics
	Vought Aircraft
	Northrop Grumman
	Lockheed Martin
	Raytheon
	ATI/SCRA
US Government:	NIST
	Federal Aviation Administration
	Navy
	Air Force
	Army
	CALS Program Office

A variety of these scoping and requirements meetings took place at different locations during the 1994-95 time frame.. Each Unit of Functionality was validated by the experts at these industry meetings. The Units of Functionality followed scoping based on typical industry documents such as a parts list.. Experts brought examples of these different type of TDP documents and national and international specifications pertaining to these different example documents. Scoping and requirements continued to be refined as review of the AP document continued into the international arena.

The current Application Activity Model (AAM) in the AP 232 document is a subset of a larger activity model that was also used to scope AP 209, Finite Element Analysis AP. The subset of this larger activity model scoped AP 232 so that information could be exchanged among PDM systems in the design, manufacturing and logistic support life cycle phases. The AAM is found in Annex F of the AP 232 document.

5 ARM Validation

5.1 Pre Committee Draft Requirements Validation

The data exchange requirements covered by the scope of AP 232 has been reviewed by a variety of people, from both commercial and government views. Initial review came from United States personnel focusing on both commercial and government data exchange requirements. International comments on the AP 232 document were received and incorporated from Nigel Shaw, UK and Masaru Suzuki, Japan. Requirements for the European ODETTE standard ENG DAT were compared and found to be covered by AP 232. Requirements for the USA ANSI standard Y14.36 were also compared and found to be covered by AP 232. ENG DAT deals with exchanging the meta data about a drawing package. Y14.36 deals with parts list, data list, indented data list and index list. ISO Standards Handbook 12 was also used to validate design information requirements were covered.

5.2 CD Requirements Ballot Comments

The French Aerospace Missile Industry provide extensive review of the requirements in the Exchange Management area. Requirement voids discovered during the ballot cycle dealt primarily with document header parameters such as keywords, abstract, and language used. Clarifications in distinguishing between entry properties for documents and entry properties for a part were identified and incorporated into the Data Definition Exchange Unit of Functionality (UoF).

The requirement for quantity accuracy was identified as a void by Boeing Aircraft personnel. This void was identified in the Parts List (PL) UoF. Quantity accuracy of exact, as required, and approximate were defined and incorporated into the application protocol.

5.3 ISO Walk-throughs of the ARM

Requirement Walk-throughs have been conducted at ISO meetings, Washington DC. (Crystal City) , Kobe Japan, and Grenoble France, Oct 1995. These walkthroughs established requirements guidelines such as 1) Do not try to standardize document categories, let the using industry or exchange partners do that; 2) Allow for different levels of configuration accountability in the requirements model; and 3) Support both part structure and document structure management paradigms.

5.4 Data Population of ARM

The parts list portion of the ARM has been validated through populating with real production data using the NIST data probe tool. This was done with data from Lockheed Martin, Boeing Military and Northrop Grumman parts lists. Annex B provides summary of data used in the ARM soft mapping. Selecting aircraft Parts Lists as the example parts provided wide coverage of requirements because of their complexity. The scenario in the AAM was selected because of the comprehensive view it gives as to what is needed to design and exchange complex parts information.

The French Aerospace Missile industry has validated the ARM through the implementation of its Baracha system. Alain Calvaire, France is the contact for the Baracha system, This Implementation instantiates the ARM constructs of the Exchange Management Conformance Class called the Data Definition Exchange. Based on the implementation of the Baracha system validation of the ARM model was performed. Minor requirement voids were also identified. These requirement voids were presented at the ISO meeting in New Orleans, Nov. 1999 and solutions agreed upon. These solutions were incorporated into the application reference model (ARM).

5.5 Pilots that Validated Requirements

The data packaging portion of the ARM and AIM has been utilized in a pilot, the STAMP program sponsored by the US government. The STAMP program validated the usefulness of customer to supplier exchange of product structure and associated data files. Lockheed Martin has implemented a pre-CD version of AP 232 which manages the exchange of production files to their suppliers. A few requirement voids and modeling anomalies were uncovered and corrected. After corrections were incorporated the requirements in AP 232 were sufficient to satisfy Lockheed Martin's exchange configuration management needs.

5.6 Abstract Test Suite Validation of Requirements

During the abstract test suite development, a few requirement anomalies were uncovered. The ARM was fixed so that 1) a data_list and an index_list could be referenced with just their identification information and not have to include the body of the document; 2) the size of a piece of stock could be dependent on its usage; and 3) all stock size parameters can have a name. A few miss matched types and the need to make some attributes optional were also identified and corrected. The abstract test suite development has provided a good validation of the application protocols requirements.

5.7 DIS Requirements Ballot Comments

Ballot comments from the United States, Germany, and France included comments that focused on harmonization with PDES Inc.'s and ProSTEP's PDM Schema. The PDM Schema is the results of harmonizing AP 214, AP 203 2nd edition, AP 212, and AP 232. Clarification and completion of ARM concepts in AP 232 were made to reflect these harmonization decisions. These clarifications were in the following areas:

- Include Files as indentured list entries
- Allow multiple types of file relationships
- Clarify allowable assembly relationships
- Allow retrofit usage information for an indentured_data_list_entry
- Provide certification information for parts and documents
- Allow time interval effectivity with event occurrence information
- Provide general properties capability

6 Integrated Resources Interpretation

The ARM to AIM mapping has gone through four iterations. The first iteration consisted of utilizing Mitch Gilbert to guide the initial mapping process. The second iteration provided changes to reflect a proposed solution to handle document configuration. The third iteration (which ended up in the CD version of the AP 232 document) incorporated changes based on harmonization with AP 214 and AP 203 and the CD draft of the 2nd edition of several integrated resource parts. The fourth iteration incorporated some more harmonization agreements with AP 214 through the PDM schema effort. The fourth iteration also incorporated changes based on the DIS 2nd edition of the Integrated Resource parts ISO 10303-41, ISO 10303-42, ISO 10303-43, and ISO 10303-44. This fourth iteration is what is found in the DIS version of AP 232.

6.1 First ARM to AIM Mapping(1994-1995)

Several voids were identified in the integrated resource models at that time. The major void being the lack of allowing a document to be a configurable thing with versioning and properties associated to it. SEDS 165 was written addressing this void. This provide the basic mapping for the whole application protocol .

6.2 Second ARM to AIM Mapping(1996-1997)

A version of the AIM was written reflecting the proposed solution in SEDS 165. The mapping table in the CD version reflects the harmonized document version solution between AP 214 and AP 232. The revised Part 41 incorporated the new constructs to support versioning of documents.

Harmonization of how files are identified and properties of files are mapped was achieved between AP 214 and AP 232.

SEDS 202 was submitted dealing with relating and applying multiple document_usage_contraints. The CD version Part 41 2nd edition contained additional constructs that satisfy these requirements. SEDS 203 was submitted dealing with the need for multiple types/categories for documents. This has been satisfied by mapping the requirement for document to the Part 41 'product' construct and using 'product_category(s)' to collect multiple types.

6.3 CD ARM to AIM Mapping(1998)

A version of the AIM was written to incorporate the changes between the CD and DIS 2nd edition versions of the Part 41, 42,43,44. The bulk of the changes were in the area of management resource entities. All management resource entity subtype names were changed to match the pattern that placed the word 'applied_' in front of the supertype's name. Example supertype – organization_assignment, subtype – applied_organization_assignment. This allowed for greater harmonization across APs . The addition of a role attribute on each management resource entity was also incorporated into the mapping table which allowed a context to be placed on the assignment relationship.

Harmonization resolutions in the area of documents as products were also incorporated. The main harmonization area was document properties. These include source, creation, and format document properties.

6.4 DIS ARM to AIM Mapping(1999)

The DIS mapping table in AP 232 reflects the IS version of the 2nd edition of the Part 41, 42, 43, 44. Changes from the CD version were mainly made to fix the new approach for role attributes in the management resource entities and the new approach for the addition of new id, name, and description attributes in existing entities. Mapping table changes occurred when CD ballot issue resolutions were incorporated also. Additional changes were made to reflect harmonization in some string values with the PDM schema harmonization effort.

Approximately 30 mapping table rules were identified. These rules were made into formal global rules in section 5.2 of the AP 232 document. There were string values identified in the mapping table. Many of these string values could not be accommodated by a global rule because of the complexity of identifying their usage context. Some of this is do to the mapping style of constraining the value of an attribute string within an integrated resource entity instead of sub-typing the entity to identify a new context. This mapping style was initiated during the harmonization process among AP 232, P 214, and AP 203 edition 2. These string values that are constrained are now captured in the Recommended Practice Guide of AP 232 and the PDM Schema Usage Guide.

The mapping table contains an extra table called the ‘common table’. This table was used to collect requirements that were common to all other Units of Functionality except the Presentation UoF and the Reference Document UoF.

The entities that were specialized in AP 232 are shown in table 1 with and explanation why they were specialized.

Table 1 - Specialized Entities in AP 232

AP 232 Specialized Entity	IR entity it was specialized from	Why Specialization was needed
applied_action_assignment	action_assignment	Change_identification (AP Harmonization)
applied_approval _-assignment	approval_assignment	All types of aprovals (AP Harmonization)
applied_classification _-assignment	classification_assignment	Assigning a class or class system to product data (AP Harmonization)
applied_contract_assignment	contract_assignment	Assigning a contract to product data (AP Harmonization)

AP 232 Specialized Entity	IR entity it was specialized from	Why Specialization was needed
applied_date_and_time_-assignment	date_and_time_assignment	Applying date and time together to product data (AP Harmonization)
applied_date_assignment	date_assignment	Applying only date to product data (AP Harmonization)
applied_document_reference	document_reference	Establishing an association from a document to other product data. Also used as a collector for list of information that someone would like to manage as a document. Document.role attribute provides the semantic for the association. (AP Harmonization)
applied_doucment_usage_-constraint_assignment	document_usage_constraint_-assignment	Allows a portion document to apply to some product data. (AP Harmonization)
applied_effectivity_-assignment	effectivity_assignment	Allows effectivity to be applied to product data independent of an assembly relationship. (AP Harmonization)
applied_effectivity_context_-assignment	effectivity_context_-assignment	Allows the context of a effectivity to be identified and placed on an effectivity_-assignment. (AP Harmonization)
applied_external_-identification_assignment	external_identification_-assignment	Allows the ability to identify the path and storage node location for any external file within in context such as a URL. (AP Harmonization)
applied_group_assignment	group_assignment	Allows groups of information to be identified with its membership. (AP Harmonization)

AP 232 Specialized Entity	IR entity it was specialized from	Why Specialization was needed
applied_identification_-assignment	identification_assignment	Allows of alternate identification for product data and allows for a simple version attribute for files (document_file) (AP Harmonization)
applied_organization_-assignment	organization_assignment	Provides additional context for product data that may provide ownership information about the data. (AP Harmonization)
applied_organizational_-project_assignment	organizational_project_-assignment	Provides additional context of the project within an organization as to what data the project controls (AP Harmonization)
applied_person_and organization_assignment	person_and_organization_-assignment	Assigns a person within the context of an organization to product data (AP Harmonization)
applied_presented_item	presented_item	Allows the ability to associate the presentation of a list of product data to the identification of the document it represents. (AP Harmonization)
applied_security_-classification_assignment	security_classification_-assignment	Allow a security classification to be place on different types of product data. (AP Harmonization)
class	group	Identifies the class of an object. (Harmonized with AP214)
class_system	group	Identifies the method for classifying. (Harmonized with AP214)

AP 232 Specialized Entity	IR entity it was specialized from	Why Specialization was needed
design_make_from_-relationship	product_definition_-relationship	Allows for a make from part relationship with the semantics that one product's design has been derived from another product's design. (From AP 203)
document_file	document & characterized_object	Used to Identify a file and allows for the file to have properties applied to it. (Harmonized with AP214)
document_product_-equivalence	document_product_-association	Used to provide a path to get to document_reference and document_usage_constraint for document as a product mapping approach (Harmonized with AP214)
externally_defined_planar_-box	externally_defined_item & planar_box	Allows a planar box to identify an externally defined page size code. (AP 232 specific)
externally_defined_symbol_-and_placement	externally_defined_symbol & placement	Allows an externally defined symbol to have an associated placement on a page. (AP 232 specific)
language_assignment	classification_assignment	Specifies the type of language of the product data that the language assignment is associated with. (Harmonized with AP214)
make_from_usage_option_-with_reference_designator	make_from_usage_option & assembly_component_usage	Allows a make_from usage_-option to have a reference_-designator and an assembly_-component_usage_substitute can be identified. (AP 232 specific)
other_list_table_-representation	representation	Identifies a table of information that is used for design disclosure. (AP 232 specific)

No pruning of Select Type members that were pulled in from the Integrated Resources were required. Select Types that were pulled from the Integrated Resources and not referenced by any other entity in the schema, were pruned from the schema.

7 AIM Validation

7.1 Successful Compiling of AIM

The AIM has been compiled successfully by several compilers. The compilers are NIST FEDEX, ECCO, ITI's PDELib, STEPTools Inc. and EPM's ExpressDataManager. During this compiling process, errors in a few geometry and drafting AIC rules were uncovered and sent to the appropriate part owner for correcting through the SEDS process. These SEDS can be found in Annex C. The EPM compiler gave a few Warnings because it would like to see explicit path names on attributes that are inherited and are used in a local rule. To make these warnings go away, changes to the Integrated Resource model would have to occur. These changes to the Integrated Resource will not be made because the EXPRESS there is valid and interpretable. Participates in the compiling and debugging process were the following companies,

- EPM, Norway
- Northrop Grumman, US
- JAI, Japan
- Boeing, US
- Lockheed Martin, US

7.2 Abstract Test Suite Creation

The Abstract Test Suite provides test purposes for each ARM and AIM construct. During the creation of these test purpose, the ARM and AIM were syntactically validated. Some semantics anomalies in the ARM were identified and corrected.

Test Cases for the following Conformance Classes will be included in the initial version of the Abstract Test Suite.

- CC 1: Data Definition Exchange (DDE) for files (in-work by Lockheed Martin)
- CC 2: Data Definition Exchange (DDE) for TDP elements (in-work by Lockheed Martin)
- CC 3: Data Definition Exchange (DDE) for indentured methods (in-work by LM)
- CC 4: Parts List (PL)
- CC 6: Indentured Data List (IDL)

Each test case will include a physical file example and instance diagrams.

7.3 Pilot Validation of the AIM

Validation of the AIM has been performed through pilots. The first was a demonstration showing how product structure along with associated data files could be exchanged between different Product Data Management (PDM) systems. This demonstration was part of the US Air Force PAS-C program demonstration. The PDES STIR pilot is utilizing AP 232 to formulate intelligent technical data packing list to send to low tier suppliers. Lockheed Martin is now using this in a production implementation. The STAMP program is utilizing AP 232 AIM to facilitate technical data exchange between higher tier subcontractors. Boeing Commercial Aircraft company and some of its high tier suppliers are actively developing production software to exchange parts list and indentured data list information. Each pilot has fed back changes to the existing AIM schema via rules or constraints.

7.4 Recommended Practice Guide

An initial Recommended Practice Guide has been created for AP 232 that covers 5 conformance classes. This recommended practice guide provides guidance for implementing exchange management of files, documents and product structure with associated documents and files, plus formal parts list and indentured data list. Great effort has been made to harmonize with other ISO 10303 application protocols. This recommended practice guide utilizes the harmonization that is being captured in the PDM schema Usage Guide being created by PDES Inc. and ProSTEP. The AP 232 recommended practice guide adds to the results of the PDM Schema usage guide to include additional functionality.

A summary of the AP 232 recommended practice guide scope follows:

- Exchange Management for (files, documents, product structure)
- Document Change Identification and Configuration Properties
- General Information (notation, revision history, source identification, special conditions)
- Parts List (header, body)
- Indentured Data list (header, body)

8 Conformance Requirements Evaluation

The completeness of coverage for each of the conformance classes match very closely with the requirements organization of the Units of Functionality. The conformance classes for different types of lists match closely with current industry standards for similar documents that contain lists. For Parts list, Data List, Index List and Indentured Data List there is ANSI 14.26. For Parts list, Data List and Index List there is also MIL-STD-100 and ISO Standards Handbook 12. For the conformance class Data Definition Exchange the requirements of the ODDETTE ENGDAT standard and the US MIL-STD-1840 standard are covered. The Product Data Set conformance class has a unique feature that allows a set of geometry to be captured without the explicit

knowledge of what thing it represent. This knowledge may be capture externally of STEP or through the DDE or IDL conformance classes of AP 232.

As noted in section 7.4 of this validation report, a Recommended Practice Guide has been developed. This recommend Practice Guide is being currently utilized and refined in the development of production systems, such as Boeing's supplier DCAC team.

9 Validation of Document Quality

9.1 CD Document Quality

Validation of the Quality of the document has been extensive. A team of six people have gone through the document and reviewed each section. Examples of things that were identified and corrected were the following;

- Circular definitions,
- Incorrect cross references,
- Inconsistent wording for similar notes
- Non Supplementary Directives Conformance

The issue log and the disposition of each issue is in the word file 'doc_issue_log_232.doc' located at the URL noted below.. A major emphasis was put on identifying and correcting cross reference errors. Each correction has be verified that it has been incorporated correctly.

Formal issues log for the requirements and the AP team document quality check for the Committee Draft version of the application protocol can be pulled from these two public ftp sites.

ftp://cartman.atcorp.org/pub/programs/pdesinc/ap232/qual_cmts/req_issue_log_232.doc
ftp://cartman.atcorp.org/pub/programs/pdesinc/ap232/qual_cmts/doc_issue_log_232.doc

9.2 DIS Document Quality

A thorough validation of the Quality of the document has been made. Jesse Crusey and Greg Paul have reviewed each section of the AP 232 document. Supplementary Directives document ISO TC 184/SC4/N858 and its revisions in ISO TC/184/SC4/QC N151 were used as the guide lines for the document's format. A summary of things that were identified and corrected is the following:

- Non Supplementary Directives conformance
- Text font sizes in figures
- Reduction of white space in figures (AIM diagrams from 127 figures to 60 figures)
- Cross references
- Missing definitions
- Additional examples

The issue log and the disposition of each issue is in the Internal review checklist, SC4/WG3/N956, for the DIS document. This Internal review checklist is available on the SOLIS ftp server.

9.3 IS Document Quality

A thorough validation of the Quality of the document has been made. Jesse Crusey and Greg Paul have reviewed each section of the AP 232 document. Supplementary Directives document ISO TC 184/SC4/N858 and its revisions in ISO TC/184/SC4/QC N151 were used as the guide lines for the document's format. A summary of things that were identified and corrected is the following:

- Non Supplementary Directives conformance
- Text Quality in figures
- Cross references
- Missing IR part source identification in mapping tables

The issue log and the disposition of each issue is in the Internal review checklist, SC4/WG3/N1059, for the DIS document. This Internal review checklist is available on the SOLIS ftp server.

Annex A - ODETTE ENGDAT standard to AP 232 ARM Objects

Table 2 - Segment names and their meaning for ENGDAT

MID	Message Identifier	Message identifier
SDE	Sender-Details	Information about the sender
RDE	Receiver-Details	Information about the receiver
DAN	Document Reference	Relationship to other messages
EFC	Engineering File Characteristics	Information about user data
DSD	Drawing Specification Details	Description of the drawings
LOF	Link to other Files	Links to other files within this message
FTX	Free Text	Transfer arbitrary text
SEC	Security	Security information
TOT	Totals	Number of files

Table 3 - How AP232 satisfies ENGDAT's requirements

ENGDAT File Segments		AP 232 Exchange Management Conformance Class	
Seg.#	Name & Description of Capability	Sec. #	Name & Description of Capability
MID	Message Identifier	4.2.44	Element Identifier
SDE	Sender – Details	4.2.122 4.2.37	Release_Authentication Design_Authority
RDE	Receiver – Details	4.2.148	System_Destination
DAN	Document Reference	4.2.25.6 4.2.25.3	Procurement_References Delivery_Accounting
EFC	Engineering File Characteristics	4.2.131 4.2.55 4.2.56 4.2.147 4.2.46.2	Simple_List_of_Files File File_format System_declaration Include_flag
DSD	Drawing Specification Details	4.2.44 4.2.13	Element_Identification Change_Identification
LOF	Links to other Files	4.2.55.5 4.2.147.5 4.2.131	File.native_format_file_name related_element_identifier Simple_list_of_files
FTX	Free Text	4.2.96	Notation
SEC	Security	4.2.125	Security_Classification
TOT	Totals	4.2.131	Simple_list_of_files

Annex B - ARM soft mapping results

The ARM soft mapping results is a report generated from actual production data. The contents of an actual parts list was mapped to the ARM constructs. This was done using the NIST tool called DataProbe. An express Part 21 file was generated of the parts list. A comparison table mapping different parts list information components to their matching ARM entity component was also created.

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

Tool Acquisition

I was asked to take a part's list from the Vought Aircraft Center and map it to the newly created technical data package ARM. I was also asked to create a physical file (Part 21) using this mapping. I was not familiar with the parts list data nor was I familiar with working with express models. The team felt this was an advantage because they wanted to know how difficult their work would be for the novice to understand.

My first task was to get software tools to help me do this mapping. I obtained a tool from ITI which was compiled specifically for the TDP ARM as it existed prior to some changes I was forced to make. I also spent considerable time downloading the tools needed to run DataProbe from NIST. This included the GNU 2.7.0 C++ compiler. I was successful in getting Fedex to run on the RS6000 but ran into great difficulty compiling DataProbe. My problem was not because of the change in platform, but rather, it was due to two main things:

1. The new version of the GNU C++ compiler was pickier than the compilers used to develop DataProbe and Interviews. Many of the routines in DataProbe and Interviews would no longer compile. With the help of NIST support, I had to rewrite some of the routines. I was forced to remove inline definitions from header files into the body of the source routines. This process took many hours.
2. We could not use the "make" utility to compile the source routines for DataProbe or Interviews because the makefiles which were supplied used syntax to wildcard files which were not recognized by our version of "make". I don't know if the version of "make" on the SUN has more capability or if we could have downloaded a better version of "make" to be successful. At any rate, I was forced to write script files to compile each routine in each directory for both Interviews and DataProbe. Note that Fedex did not have this problem.

It took me approximately 90 work hours to get DataProbe up and running on the RS6000.

Running the express model through FEDEX revealed some syntax problems which forced me to change the express model prior to making a data probe. For example, Fedex will not allow a list of select values to have the same name as an entity. I was forced to change these. Also, I had to add in some subtype statements for specific entities which generally inherited from an ABS. In doing this, I could not figure out the syntax to include both statements within an entity so I commented out some of the ABS statements.

After making these changes, I ran into some incompatibilities with the ITI tool. Therefore I could only do minor verification using the ITI tool. Having both tools was helpful because I could check out my logic on the more visual ITI tool and fix my problems in the DataProbe tool. Also, comparing the two tools output led me to discover several syntax errors from my input to DataProbe.

Data Mapping

I worked with an experienced team member to do a soft mapping of the parts list data to the express-G mapping of the TDP arm. This process was quick, largely do to the experience of the team. My role was to check out the initial mapping and provide some more detail. Again, this was not difficult.

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

Physical File Creation

I started to build a physical file from the actual parts list data. This was much more difficult. Using a tool like DataProbe or ITI would be necessary build a physical file. As I began entering data, various attribute fields showed up as required. I had trouble in many causes determining which part of the item went into which field. Also, base elements in our parts list often mapped to pieces of the same entity or they could be mapped in several different ways. I tried to document some of these issues in the table 1.2.

The most difficulty I had was deciding how to relate parts to show fields like "quantity used in next assembly". I'm unsure of the way I did this. This corresponds to field 26 which is marked on our parts list.

Another problem for me was the documentation. I would like to see an index entry for each and every entity and attribute. I would also like to see the documentation for those entities, including examples.

Other comments:

- Reference document usage seems to treat a document as an element identification so you would need 3 entities per element referenced in any document.
- For field 10, I had some question whether to create a new element identification or use 10 as the title of the element identification used for field 3. I chose the latter.
- What should the required field "unique identifier" for person be?
- For field 12, I used drawing_general_note to describe all the notes, even though some were for material and finish.
- Fields 6 and 7 appear to be in two places - change identification and configuration -> release_authorization
- Release authentication has a required field of authentication. What goes there?
- Field 22 needed element identification for fields 34,35,36
- Field 23, I assumed the unit of measure was 1
- Drawing and suffix requires both identifier and drawing number. Didn't know what to do.
- I had much confusion with the fields 17 and 19. I related these fields using item_usage and created more items (#31, #40, #48, #44) to get a somewhat representative sample. the -014 part was created because it also appears in field 17 on 'BIM1019'.
- I created an item_list for field 16. I'm not sure this is correct.

More comments are described in table 1.2.

Part 21 File for Vought Aircraft Sample Part's list.

```
#1=PERSON('D','L','ODELL',$,'80948-e172661');
#2=DATE(4,5,$,$,1991);
#3=RELEASE_AUTHENTICATION(#2,'AUTHENTICATION',#1,#5,$);
#5=COMPANY('LTV AIRCRAFT PRODUCTS GROUP','DALLAS TEXAS');
#6=CONFIGURATION((#15),$,(#3),(#17),$,$);
#9=HEADER(#10,5);
#10=HEADER_CONFIGURATION_WITH_ELEMENT_IDENTIFICATION(#6,#11);
#11=ELEMENT_IDENTIFICATION('PL 3121A383','CAP=LWR-LL SUB STRUTURES-
```

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

```
BOND ASSY ',#32,#13,$,(#29));
#13=DESIGN_AUTHORITY(#5,$,#1);
#14=COMPANY_CODE('FSCM 80378',TEXT('FSCM'));
#15=CONTRACT('F33654981-C-0067',$,$);
#16=REVISION('J',#2,$,$,$);
#17=SECURITY_CLASSIFICATION('UNCLASSIFIED',$);
#20=PARTS_LIST_BODY((#24,#25,#62,#63),$,(#91),(#103,#109));
#21=PARTS_LIST($,$,#22,#20);
#22=PARTS_LIST_HEADER(#9);
#24=NOTATION(DRAWING_GENERAL_NOTE,'1','FOR FINISH CODE DEFINITION.
SEE SPEC CVA TB-21. ');
#25=NOTATION(DRAWING_GENERAL_NOTE,,$,'ROVING, EPOXY IMPRG GRAPHITE
TOW. PER SPEC 207-7-506');
#28=ITEM_IDENTIFICATION(IDENTIFIER('005'),'ANGLE',$,#13);
#29=ELEMENT_TYPE('$PL',ELEMENT_CODE_TYPE_ENUMERATION(MIL_STD_804.));
#31=ITEM($,#37,$,(#34),$,#28,$,$,$);
#32=CHANGE_IDENTIFICATION($,'J',#2,$,$,$,$,$);
#33=ITEM_USAGE(#39,#31,$,$,$,$,$);
#34=REFERENCE_DOCUMENT_USAGE(#35,$,$,$,$);
#35=REFERENCE_DOCUMENT(#36);
#36=ELEMENT_IDENTIFICATION('F857','FINISH CODE',$,#13,$,$);
#37=WEIGHT($,3.44,1);
#38=WEIGHT($,3.44,1);
#39=LIST_ITEM_USAGE($,$,$,('C17.1'),'02',$);
#40=ITEM($,#42,$,(#34),$,#41,$,$,$);
#41=ITEM_IDENTIFICATION(DRAWING_SUFFIX_NUMBER_COMBINATION(#46),'ANG
LE',$,#13);
#42=WEIGHT($,3.44,1);
#44=ITEM($,$,$,$,#45,(#62),$,$);
#45=ITEM_IDENTIFICATION(IDENTIFIER('BIM1019'),'GRAPHITE ROVING',$,#13);
#46=DRAWING_SUFFIX_NUMBER_COMBINATION('006',#11);
#47=DRAWING_SUFFIX_NUMBER_COMBINATION('014',#11);
#48=ITEM($,#55,$,(#34),$,#49,(#63),$,$);
#49=ITEM_IDENTIFICATION(DRAWING_SUFFIX_NUMBER_COMBINATION(#47),'BON
D ASSY',$,#13);
#50=ITEM_USAGE(#39,#40,$,$,$,$,$);
#53=LIST_ITEM_USAGE($,$,$,('G15.1'),'01',$);
#54=ITEM_USAGE(#53,#48,$,$,$,$,$);
#55=WEIGHT($,10.7,1);
#57=LOCALLY_DEFINED_ITEM($,#48,$,A_NUMBER(0.3),$,$,$);
#58=MADE_FROM_STOCK_MATERIAL($,#48,$,WEIGHT(#97),$,$,$,#59,(#93),1);
#59=STOCK_MATERIAL(#60,$);
#60=ITEM($,$,$,$,$,#61,$,$,$);
#61=ITEM_IDENTIFICATION(IDENTIFIER('M1019'),'MATL CD',$,#13);
#62=NOTATION(DRAWING_GENERAL_NOTE,'4','QUANTITIES SHOWN ARE
ESTIMATED POUNDS. ');
#63=NOTATION(DRAWING_GENERAL_NOTE,'3','FABRICATE PER SPEC 208-7-300');
#66=ITEM($,$,$,$,$,#67,$,$,$);
```

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

```
#67=ITEM_IDENTIFICATION(IDENTIFIER('001'),",",$, #13);
#69=ELEMENT_IDENTIFICATION(' 3160C201','ICD', $, #107, $, $);
#71=TDP_ELEMENT_LIST_ITEM(#69, $);
#77=COMPANY_CODE('76823',COMPANY_CODE_TYPE_ENUMERATION(.CAGE.));
#78=ITEM_IDENTIFICATION(IDENTIFIER(' 3121B011-001'),'NEXT ASSEMBLY
PART NUMBER', $, #13);
#80=SEQUENCE_EFFECTIVITY((#83), #81, $, '1001', '1002', 1, 1);
#81=PRODUCT_CONFIGURATION('CAP', #82, $);
#82=PRODUCT_MODEL('102100A');
#83=APPROVAL('WHAT?', #2, $);
#84=ITEM_LIST(#85, COMPONENT_LIST_TYPE_ENUMERATION($, $);
#85=ITEM_IDENTIFICATION(IDENTIFIER(' 3121B011-002'),'NEXT ASSEMBLY
PART NUMBER', $, #13);
#86=PRODUCT_MODEL('102100A');
#88=ITEM_USAGE($, #89, #80, A_NUMBER(1), A_NUMBER(1), $, $);
#89=ITEM($, $, $, $, $, #78, $, $, $);
#90=ITEM_LIST_DRAWING(#11, #49);
#91=ITEM_LIST(#49, COMPONENT_LIST_TYPE_ENUMERATION(.ASSEMBLY_DEFINE
D_ON_DRAWING_COMPONENT_LIST.), (#92, #58));
#92=ITEM_USAGE($, #40, $, A_NUMBER(1), $, $, $);
#93=REFERENCE_DOCUMENT_USAGE(#100, $, $, $);
#94=ELEMENT_IDENTIFICATION('207-7-503', 'ROVING, EPOXY IMPRG GRAPHITE
TOW', $, #13, $, $);
#97=WEIGHT($, 0.3, 1);
#100=SPECIFICATION_DOCUMENT(#94);
#102=ELEMENT_IDENTIFICATION('ND 1270L007', 'DATA MAP', $, #107, $, $);
#103=TDP_ELEMENT_LIST_ITEM(#69, $);
#107=DESIGN_AUTHORITY(#108, #77, #1);
#108=COMPANY('NORTHROP GRUMMAN', 'PICO RIVERA CA');
#109=TDP_ELEMENT_LIST_ITEM(#102, $);
```

Table 1.1

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

Physical File Comments

PL#	Comments	Part 21 Definition
11	The required unique identifier was not clearly specified. I was told to combine the CAGE code with the employee number.	#1=PERSON('D','L','ODELL',\$,'80948-e172661')
6		#2=DATE(4,5,\$,\$,1991)
	There is not a 1-1 mapping between this field and 6,7 in our parts list.	#3=RELEASE_AUTHENTICATION(#2,'AUTHENTICATION',#1,#5,\$)
2		#5=COMPANY('LTV AIRCRAFT PRODUCTS GROUP','DALLAS TEXAS')
p4,p5,8		#6=CONFIGURATION((#15),\$,(#3),(#17),\$,\$)
1		#9=HEADER(#10,5)
1-11		#10=HEADER_CONFIGURATION_WITH_ELEMENT_IDENTIFICATION(#6,#11)
3,10	Initially, it was not clear that I needed to combine these elements into one element identification.	#11=ELEMENT_IDENTIFICATION('PL 3121A383','CAP=LWR-LL SUB STRUCTURES-BOND ASSY',#32,#13,\$,(#29))
11		#13=DESIGN_AUTHORITY(#5,\$,#1)
9	The entrees in this entity may be incorrectly specified. It may need to be COMPANY_CODE ('80378,'FSCM')	#14=COMPANY_CODE('FSCM 80378',TEXT('FSCM'))
4		#15=CONTRACT('F33654981-C-0067',\$,\$)
6,7	These fields appear to be mapable to two places in the model.	#16=REVISION('J',#2,\$,\$,\$)
8		#17=SECURITY_CLASSIFICATION('UNCLASSIFIED',\$)
14, p16, p13, p12, p30, p29	Not clear to me why the parts_list_body does not contain a list of pointers to all items in the parts list.	#20=PARTS_LIST_BODY((#24,#25,#62,#63),\$,(#91),(#103,#109))

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

PL#	Comments	Part 21 Definition
		#21=PARTS_LIST(\$,\$,#22,#20)
1, p2-11	What is the difference between this header and the generic header?	#22=PARTS_LIST_HEADER(#9)
12, 13	Some of our notes have specific functionality such as material call out or finish code. This may need to be added to the enumeration select list.	#24=NOTATION(DRAWING_GENERAL_NOTE., '1', 'FOR FINISH CODE DEFINITION. SEE SPEC CVA TB-21.')
12, 13		#25=NOTATION(DRAWING_GENERAL_NOTE., \$, 'ROVING, EPOXY IMPRG GRAPHITE TOW. PER SPEC 207-7-506')
19,20,11	Probably should have handled the dash number -005 as a Drawing Suffix Number but I didn't. This way, there is no direct tie to the part number. See #46 for the better way to handle.	#28=ITEM_IDENTIFICATION(Identifier('005'), 'ANGLE', \$, #13)
19,20,p22 .p23		#29=ELEMENT_TYPE('SPL', ELEMENT_CODE_TYPE_ENUMERATION(MIL_STD_804.))
6,7		#31=ITEM(\$, #37, \$, (#34), \$, #28, \$, \$, \$)
18,21		#32=CHANGE_IDENTIFICATION(\$, \$, 'J', #2, \$, \$, \$, \$)
22		#33=ITEM_USAGE(#39, #31, \$, \$, \$, \$)
22		#34=REFERENCE_DOCUMENT_USAGE(#35, \$, \$, \$)
22		#35=REFERENCE_DOCUMENT(#36)
23		#36=ELEMENT_IDENTIFICATION('F857', 'FINISH CODE', \$, #13, \$, \$)
23		#37=WEIGHT(\$, 3.44, 1)
18, 21		#38=WEIGHT(\$, 3.44, 1)
19,20,21	-006 should relates to -014 in field 26. I don't see the definition for 26 on this item.	#39=LIST_ITEM_USAGE(\$, \$, \$, 'C17.1', '02', \$)
		#40=ITEM(\$, #42, \$, (#34), \$, #41, \$, \$, \$)
19,20,21		#41=ITEM_IDENTIFICATION(DRAWING_SUFFIX_NUMBER_COMBINATION(#46), 'ANGLE', \$, #13)

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

PL#	Comments	Part 21 Definition
23		#42=WEIGHT(\$,3,44,1)
19,20,21	This is a material and may need to be handled differently.	#44=ITEM(\$,\$,\$,\$,\$,45,(\$62),,\$,\$)
19,20,21	See #44 Comment.	#45=ITEM_IDENTIFICATION(IDENTIFIER('BIM1019'),'GRAPHITE ROVING',,\$,#13)
19		#46=DRAWING_SUFFIX_NUMBER_COMBINATION('006',#11)
19		#47=DRAWING_SUFFIX_NUMBER_COMBINATION('014',#11)
19,20,21, 22, 25, 23	-014 item.	#48=ITEM(\$,\$,55,,\$,(\$34),,\$,49,(\$63),,\$,\$)
19		#49=ITEM_IDENTIFICATION(DRAWING_SUFFIX_NUMBER_COMBINATION(#47),'BOND ASSY',,\$,#13)
18 to 19		#50=ITEM_USAGE(#39,#40,\$,\$,\$,\$,\$)
18, 21		#53=LIST_ITEM_USAGE(\$,\$,\$,('G15.1'),,01',,\$)
18 to 19		#54=ITEM_USAGE(#53,#48,\$,\$,\$,\$,\$)
23		#55=WEIGHT(\$,10,7,1)
26		#57=LOCALLY_DEFINED_ITEM(\$,48,\$,A_NUMBER(0.3),,\$,\$)
p19, p44, p26	This path was used to put in the material code M1019. It is not pointed to from Item #44. How should they be related since they are on our parts list?	#58=MADE_FROM_STOCK_MATERIAL(\$,48,\$,WEIGHT(#97),,\$,\$,#59,(\$93),1)
p26		#59=STOCK_MATERIAL(#60,\$)
26		#60=ITEM(\$,\$,\$,\$,\$,61,\$,\$,\$)
26		#61=ITEM_IDENTIFICATION(IDENTIFIER('M1019'),'MATL CD',,\$,#13)
12,13		#62=NOTATION(DRAWING_GENERAL_NOTE,,4,'QUANTITIES SHOWN ARE ESTIMATED POUNDS.')
12, 13, f25		#63=NOTATION(DRAWING_GENERAL_NOTE,,3,'FABRICATE PER SPEC 208-7-300')
26	Artificial Dash number which means reference documents for parts list.	#66=ITEM(\$,\$,\$,\$,\$,67,\$,\$,\$)
		#67=ITEM_IDENTIFICATION(IDENTIFIER('001'),,\$,\$,#13)
29, 30		#69=ELEMENT_IDENTIFICATION(' 3160C201','ICD',,\$,#107,\$,\$)
p29, p30		#71=TDP_ELEMENT_LIST_ITEM(#69,\$)

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

PL#	Comments	Part 21 Definition
28, 31		#77=COMPANY_CODE('76823',COMPANY_CODE_TYPE_ENUMERATION(CAGE.))
40		#78=ITEM_IDENTIFICATION(IDENTIFIER(' 3121B011-001'),'NEXT ASSEMBLY PART NUMBER',\$.#13)
38, 39, 41, 42	I'm not sure that qty = 1 for 41 and 42.	#80=SEQUENCE_EFFECTIVITY((#83),#81,\$,'1001','1002',1,1)
36		#81=PRODUCT_CONFIGURATION('CAP',#82,\$)
37		#82=PRODUCT_MODEL('102100A')
?	I have no idea how to handle this but it is a required field in #80 so I created an entity.	#83=APPROVAL('WHAT?',#2,\$)
p40	This is incomplete.	#84=ITEM_LIST(#85,COMPONENT_LIST_TYPE_ENUMERATION(\$),\$)
40	Should I have split the dash number and created a separate part number entity?	#85=ITEM_IDENTIFICATION(IDENTIFIER(' 3121B011-002'),'NEXT ASSEMBLY PART NUMBER',\$.#13)
37		#86=PRODUCT_MODEL('102100A')
40 to 36,37,38, 39,41,42	Sometimes you can enter numerics as in #80 and sometimes you can't.	#88=ITEM_USAGE(\$,#89,#80,A_NUMBER(1),A_NUMBER(1),\$.#)
40		#89=ITEM(\$,\$,\$,\$,\$,#78,\$,\$,\$)
19 to 3,10		#90=ITEM_LIST_DRAWING(#11,#49)
19 to 19, 26 (17)	-014 is related to -006, Material Code, and reference documents for material code.	#91=ITEM_LIST(#49,COMPONENT_LIST_TYPE_ENUMERATION(ASSEMBLY_DEFINED_O N_DRAWING_COMPONENT_LIST.),(#92,#58))
17	Relates item to qty used in next assembly	#92=ITEM_USAGE(\$,#40,\$,A_NUMBER(1),\$.#)
44	Material Code call out for M1019	#93=REFERENCE_DOCUMENT_USAGE(#100,\$,\$,\$)
44	Call out for M1019	#94=ELEMENT_IDENTIFICATION('207-7-503',ROVING, EPOXY IMPRG GRAPHITE TOW',\$.#13,\$,\$)
17		#97=WEIGHT(\$,0.3,1)
44	I had trouble seeing the ability of using subtypes so I needed help to build this link.	#100=SPECIFICATION_DOCUMENT(#94)

ARM VALIDATION REPORT DRAFT

Submitted by Susan Schrade 1/30/96

PL#	Comments	Part 21 Definition
32,33,31		#102=ELEMENT_IDENTIFICATION(ND 1270L007', 'DATA MAP', \$, #107 \$, \$)
p31-33		#103=TDP_ELEMENT_LIST_ITEM(#69, \$)
28, 31	I had to make this up for the CAGE code. See #108.	#107=DESIGN_AUTHORITY(#108, #77, #1)
28,31	Company name does not appear on our parts list.	#108=COMPANY('NORTHROP GRUMMAN', 'PICO RIVERA CA')
p31-33	What makes tdp_elements different from items?	#109=TDP_ELEMENT_LIST_ITEM(#102, \$)

OFFICIAL ENGINEERING RELEASE

PROCESS DATE : 07/15/92 TIME : 11:05:05

LIV AIRCRAFT PRODUCTS GROUP PARTS LIST P-3121A3B3 CONTR NO F338-1-C-0067 RLSE AUTH ADI-562 DATE 04-06-61 REV LTR 3
DALLAS, TEX 2 SECURITY CLASS ** UNCLASSIFIED **

FSCM B0378 TITLT CAP-LWR-LL SUP STAINLESS-BOND ASSY

RESP ENGR 0011 DL

PAGE 1 OF 5

*** MATERIAL ***

M1019 ROVING, EPOXY IMPRG GRAPHITE TOW, M1020 FABRIC, EPOXY IMPRG WOVEN GRAPHITE FIBER, TY. I, PER SPEC 207-7-500.
M1020 FABRIC, EPOXY IMPRG WOVEN GLASS FIBER, TY I, PER M1020 TAP, EPOXY IMPRG UNIDIR GRAPHITE FIBER, TY I, PER SPEC 207-7-501.

*** FINISH ***

F807 448

F805 131/438-1C1
F808 131/438-1C1/451-1C1

*** GENERAL ***

- 1 FOR FINISH CODE DEFINITION, SEE SPEC CVA TB-21.
- 2 FOR QUANTITY OF TRAVELING AND LID ITEMS, SEE THE DRAWING'S ASSOCIATED APPLICATION LIST.
- 3 FABRICATE PER SPEC 208-7-300.
- 4 QUANTITIES SHOWN ARE ESTIMATED POUNDS.
- 5 CONTOUR DEFINED BY DATA MAP M00A12701007.
- 6 PLY/CORL LOCATION TOLERANCE IS PLUS OR MINUS .06 UNLESS OTHERWISE NOTED. FOR PLY DROP-OFF SPACING .25 OR GREATER, LOCATION TOLERANCE IS PLUS OR MINUS .12. BUT SPACING AT EACH DROP MUST BE A MINIMUM OF .13.
- 7 UNLESS OTHERWISE NOTED.
- 8 PLY ORIENTATION INDICATES FABRIC WARP DIRECTION OR TAPE FIBER DIRECTION.
- 9 DELETED
- 10 FILL GAP WITH BLM1019 ROVING PER SPEC 208-7-304.
- 11 VISUAL INSPECT PER SPEC 208-14-18, CL 1.
- 12 ULTRASONIC INSPECT PER SPEC 208-14-19, CL 1.
- 13 MAKE FROM 3121A383-003, FSCM B0378.
- 14 MACHINE AND DRILL COMPOSITES PER SPEC 208-7-303.
- 15 IDENTIFY PER SPEC CVA 9-209 (1) RUBBER STAMP.
- 16 BREAK SHARP EDGES.
- 17 MAKE FROM 3121A383-004, FSCM B0378.
- 18 SEE DRAWING FOR PLY DEFINITION AND ASSY SEQUENCE.
- 19 PRIOR TO REMOVAL OF PROCESS CONTROL PROLONGATION, MARK THE PART NUMBER, PLANNING SERIAL NUMBER, PROLONGATION NUMBER AND CLASS ON IT WITH AN INDELETIBLE INK PER SPEC CVA 9-209(8).
- 20 PREPARE AND TEST PROCESS CONTROL SPECIMENS PER SPEC 208-7-300.
- 21 DELETED
- 21 FEATURE CONTROLLED BY INTERFACE CONTROL DRAWING. COORDINATE CHANGE WITH INTERFACE CONTROL DRAWING NO. 3180C201.
- 22 FEATURE CONTROLLED BY INTERFACE CONTROL DRAWING. COORDINATE CHANGE WITH INTERFACE CONTROL DRAWING NO. 3180C202.
- 23 FEATURE CONTROLLED BY INTERFACE CONTROL DRAWING. COORDINATE CHANGE WITH INTERFACE CONTROL DRAWING NO. 3180C202.
- 24 MAKE FROM 3121A383-013, FSCM B0378.
- 25 MAKE FROM 3121A383-014, FSCM B0378.
- 26 THE ORIENTATION ROSETTES FOR THE RIGHT AND LEFT HAND COMPONENTS USED TO MAKE THE -003 AND -004 BOND ASSEMBLIES ARE THE SAME TO FACILITATE SYMMETRIC TOOLING FOR EACH COMPONENT.
- 27 WHITE POLYURETHANE COATING MAY BE APPLIED TO PRIMED DETAILS IN DETAIL OR SUBASSEMBLY OR AT FINAL ASSEMBLY AS DEFINED BY 3121A383-003 AND 3121A383-004. ALUMINUM PARTS MUST RECEIVE (2) COATS OF FINISH IN DETAIL. THE WHITE COATING MAY BE OMITTED ON 0098 AND 1000.
- 28 ALTERNATE MATERIAL FOR BLM1020 IS BLM0233. #120 GLASS CLOTH (FABRIC, WOVEN GLASS FIBER, CLASS 1, TY III, PER MIL-C-8084) APPLIED WITH BLM1283 (ADHESIVE, EPOXY, TY I, PER SPEC 207-8-443) PER SPEC 208-8-41 CLASS D.
- 29 PN "A" AND PN "B" ARE ALTERNATES FOR EFF 1003-1010
- 30 PN "A"

OFFICIAL ENGINEERING RELEASE

PROCESS DATE : 07/15/92 TIME: 11:05:05

LTV AIRCRAFT PRODUCTS GROUP PARIS LIST PL 3121A383 CONIR NO FJ0697-01-C-0087 DATE 04-02-81 REV LTR J
DALLAS, TEXAS SECURITY CLASS ** UNCLASSIFIED ** PAGE 5 OF 8

FSC#	80378	TITLE	CAP-LWR-LE SUP STRUCTURES-BOND ASSY	RESP ENG#	000001, 01

[illegible]

FCSCM 80378	TITLE	CAP-LWR-LE SUP STRUCTURES-BOND ASSY
FCSCM 80378	TITLE	CAP-LWR-LE SUP STRUCTURES-BOND ASSY

RES ENGR ODELL, DL

QUANTITY REQUIRED	ZONE/FN/ REF DES	FSCN	PART OR IDENTIFYING NO.	NOMENCLATURE/ DESCRIPTION	PT/ MATL STOCK SIZE PCC CD	FIN NOTE UNIT CO WT	INV MAT CODE
3.3.2.3.2.3.2.3.2			BIM1030	GR/EP FABRIC	02 M1030	28	
			BIM1092	GRAPHITE TAPE	02 M1092	7	
			CVA 8-21	TECH BULLETIN	43		
			CVA 8-208	PROCESS SPEC	43		
			76823 1043160C201	SUPD LIST	49		
			76823 1043160C201	ICD 30	70		
			76823 1043160C202	ICD	70		
			76823 1043160C302	ICD	70		
			81349 MIL-C-9084	MATL SPEC	47		
			76823 1043170L00732	MATA MAP 33	61		
			207-7-500	MATL SPEC	42		
			207-7-501	MATL SPEC	42		
			207-7-503	MATL SPEC	42		
			207-7-508	MATL SPEC	42		
			207-8-443	MATL SPEC	43		
			208-14-18	PROCESS SPEC	43		
			208-14-19	PROCESS SPEC	43		
			208-7-303	PROCESS SPEC	43		
			208-7-304	PROCESS SPEC	43		
			208-8-41	PROCESS SPEC	43		

OFFICIAL ENGINEERING RELEASE

PROCESS DATE 07/15/92 TIME 11:01:25
 LTV AIRCRAFT PRODUCTS GROUP APPL LSI AL 3121A383 CONIR NO F3857-81-C-0087 RLSE AUTH 2742.147 DATE 09-23-91 REV LTR F
 DALLAS, TEXAS SECURITY CLASS UNCLASSIFIED **

RESP ENGR ODELL, DL

FCM B0378 TITLE CAP-1WR-1E SUP STRUCTURES-BOND ASSY

1 { 2 3 4 5 6 7

9 10 11

*** EFFECTIVITY NOTES ***

CHG PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MINUS OR END ITEM	EFFECTIVE FROM-THRU	NEXT ASSEMBLY PART-NUMBER	QTY QTY LFF
34 35 36 37 38 39 40 41 42	CAP-1WR-1E SUP STRUCTURES-BOND ASSY	102 100A	1001 - 1002	312 18011-001	1 1
		102 100A	0998 - 0999	312 18011-002	1 1
		102 100A	1000 - 1000	312 18011-701	1 1
			1003 - 1016	312 18011-001 AR	AR
		102 100A	0998 - 0998	312 18011-240	1 1
			1000 - 1000	312 18011-240	1 1
		102 100A	1003 - 1016	312 18011-002 AR	AR
			1017 - 9999	312 18011-001	1 1
		102 100A	1003 - 1016	312 18011-517	1 1
			1017 - 9999	312 18011-002	1 1
			1017 - 9999	312 18011-518	1 1

Annex C - Related SEDS Reports

The following SEDS reports were generated against voids in the Integrated Resource parts to address requirements in AP 232.

SEDS # 165

Author Glen Ziolkko

Author's ziolkgl@mail.northgrum.com

Final Section 1. GENERAL INFORMATION
(completed by SEDS Coordinator):

SEDS Report Issue Number: 165

Date Submitted: 10/24/96

Status and date: closed 12/1/97

SEDS Team Leader:

SEDS Team Members:

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed
by author of SEDS Report):

Author: Glen Ziolkko (0004863474@mcimail.com)

Submitted by: US

Part/Clause Affected by the Issue: 41

Other Parts Affected by the Issue: AP 232 , AP 203 and any other
APs

that require versioning of
documents

Problem Description: A capability to identify multiple versions
of a document is needed in Part 41 to satisfy industry's
requirement to interrelate product and document configuration of
product data. Currently versions of documents are not a concept
in Part 41 of ISO 10303; only the concept of a basic document is
there.

Conditions Under Which the Issue Was Discovered: Implementing AP
203 within industry s product data configuration control

processes. Implementations mapped documents as products to obtain versioning capability as captured in PDES Inc.'s AP 203 Recommended Practice Guide (RPG). (Examples: Implementing AP 203 at McDonnell Douglas during the CSTAR program, and PDES Inc.'s AWS AP 203 pilot with Northrop Grumman, Lockheed Martin, ISS, IBM, and ITI). Document version need was discovered also during evaluating new Product Data Management (PDM) systems' product data configuration control processes. PDM systems version a group of product data that they identify as a document. Each document version could manifest itself as an electronic data file which is then access controlled by the PDM system. (Examples of document versions: CAD files, drawings, associated lists, analysis models, tool designs, etc.)

Proposed Solution (Optional): In defining the proposed solution below, research was done into how other versioning requirements in APs were mapped to the integrated resource constructs. The following is a table with those mappings. (Items with nothing in right column have not been mapped yet.)

Things APs Version:	Integrated Resource Mappings:
*****	*****
Products	product_definition_formation
Documents	document
Drawings/ Sheets	drawing_revision /drawing_sheet_revision
Action Requests	versioned_action_request.version_id
Analysis version	product_definition_formation
Process Plans	action
Process Planning Data	----
Files	document
Facilities model	----
Software	----
Library	----
Requirements	----

The conclusion from this research is that each versioning requirement has been satisfied by mapping to a separate integrated resource construct that fulfills the needed level of versioning.

Therefore the proposed solution below follows this approach.

Add new constructs to Part 41 which provide document versioning capabilities with the necessary relationships to support configuration of the product data within each document version. The following are the proposed new and updated Part 41 constructs. Care was taken to insure upward compatibility of existing Application Protocols that use Part 41.

Summary of Part 41 changes:

Introduce four new generic resource constructs. They are document_version, document_version_relationship, document_version_assignment(ABS), characterized_document.

EXPRESS changes to these constructs:

product_definition_with_associated_documents, and characterized_definition.

Changes to text: 2.4.4.2 Property_definition; 4.2.1 document schema introduction; 4.2.3.2 document Annex D, D.1,

New Entities: (In PART 41)

4.2.3.X document_version

Document_version is the identification of a specific variant of a document.

NOTE - A document_version may be a group of product data that is uniquely identified. The document_version may be used to identify the current levels of changes that have been applied to the document.

EXAMPLE - A document_version could identify the latest revision level, change level and issue date of a document.

EXPRESS Specification:

*)

```
ENTITY document_version;  
  id          : identifier;  
  purpose     : text;  
  of_document : document;  
END_ENTITY;
```

(*

Attribute definitions:

id: the identification of the document_version.

of_document: the document of which the document_version is a variant.

purpose: text that relates the nature of the document_version.

NOTE - The description of a document_version could identify the purpose for this particular document_version.

4.2.3.X document_version_relationship

A document_version_relationship is an association between two document_versions. An association may exist between document_versions that relate to different documents or between different versions of the same document. The meaning of the relationship for a particular context is defined in specializations of this entity.

NOTES

1 - Relationships captured using this entity may be parent child relationships. Specializations of this entity state this fact if it is true for the particular specialization.

2 - This entity, in conjunction with the document_version entity, is based on the relationship template that is described in annex D.

EXPRESS specification:

*)

ENTITY document_version_relationship;

id	: identifier;
name	: label;

```
description          : text;
relating_document_version : document_version;
related_document_version : document_version;
END_ENTITY;
(*
```

Attribute definitions:

id: the identification of the document_version_relationship.

name: the word or group of words by which the document_version_relationship is referred to.

description: text that relates the nature of the document_version_relationship.

relating_document_version: one of the document_versions which is a part of the relationship.

NOTE - The role of this attribute is defined in the application protocol or the ISO 10303 integrated resource that uses or specializes this entity.

related_document_version: the other document_version which is a part of the relationship. If one element of the relationship is dependent upon the other then this attribute shall be the dependent one.

NOTE - The role of this attribute is defined in the application protocol or the ISO 10303 integrated resource that uses or specializes this entity.

3.2.3.X document_version_assignment

A document_version_assignment is an association of a document_version with the product data.

NOTE - The concept of document_version is described in clause 4.2

EXPRESS specification:

*)

```

ENTITY document_version_assignment
  ABSTRACT SUPERTYPE;
  assigned_document_version    : document_version;
  role                        : text;
END_ENTITY;
( *

```

Attribute definition:

assigned_document_version: the document_version which is to be associated with the product data.

role: the description of the relationship between the document_version and the associated product data.

New TYPE in Part 41

2.3.3.2 characterized_document

Characterized_document allow the selection of either a document or a document_version.

EXPRESS specification:

```

*)
TYPE characterized_document = SELECT
  (document,
   document_version,
   document_relationship,
   document_version_relationship,
   document_usage_constraint);
END_TYPE;
( *

```

Part 41 Text Changes

4.2.1 This clause defines requirements for the document_schema. The resource constructs in this schema enable the description of citations of formal standards or documents that are outside the

domain of ISO 10303 and the identification of documents which are formulated around groups of product data described in and outside of ISO 10303. These resource constructs may be used to reference additional information that is relevant to the description of the product but not as the product data itself.

EXAMPLES

- International, national, and organizational standards, catalogues, and tables of engineering data are examples of formal standards or documents.

- Parts list and Data list are examples of documents which are formulated around groups of product data described in and outside of ISO 10303.

Annex D

D.1

a) Application context: a product_definition is created within one, and only one application context but can be identified to be used in one or more application context. A single application context may be used to define zero, one or more product_definitions.

b) Product property definition: a product_definition may have one or more property definitions associated with it. ** *(Need to add new sentence here to include property definitions to belong to characterized_object plus characterized_document and not just product_definition. Current sentence states: "Each property definition belongs to at least one product_definition and may belong to more than one product_definition.")**** A statement also needs to be made that: property_definitions for both products and documents may share the same representation information.

4.2.3.2 document

A document is an unambiguous reference to a formal standard or document that is defined outside the domain of ISO 10303, or the identification of a document which is formulated around a group of product data described in or outside of ISO 10303 or both.

2.4.4.2 property_definition

Section 3. RESPONSE INFORMATION (completed by SEDS Team Leader):

Resolution of this SEDS issue was not adequately addressed prior to the circulation of ISO 10303-41 CD second edition. This SEDS issue was resolved by using the product, product_definition_formation, and product_definition constructs in ISO 10303-41 to handle the requirement of document versioning. It was resolved in the ISO 10303-41 DIS second edition.

SEDS # 203

Author Glen Ziolko

Author's gziolko@airmail.net

Final Section 1. GENERAL INFORMATION (completed
by SEDS Coordinator):

SEDS Report Issue Number: 203

Date Submitted: 10/28/96

Status and date: close d12/1/97

SEDS Team Leader:

SEDS Team Members:

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by
author of SEDS Report):

Author: Glen Ziolko(gziolko@airmail.net)

Submitted by: US

Part/Clause Affected by the Issue: 41

Other Parts Affected by the Issue:

Problem Description: A document can only be of one type/category. The
need exists for a document to be classified in one or more categories.

Conditions Under Which the Issue Was Discovered: Interoperability

discussions among AP 232, AP 214, and AP 203

Proposed Solution (Optional): Change the relationship between document
and document_type to be a SET[1:?], and add new entity

ENTITY document_category_relationship;

name : label;

description : text;

category : document_type;

sub_category : document_type;

WHERE

WR1: acyclic_document_category_relationship
(SELF, [SELF.sub_category]);

END_ENTITY;

Additonal Notes:

Section 3. RESPONSE INFORMATION (completed by SEDS Team Leader):

Resolution of this SEDS issue was not adequately addressed prior to circulation of ISO 10303-41 second edition. This SEDS issue was issued as a ballot comment against the second edition of ISO 103033-41 (ISO TC 184/SC4 N638).

Final resolution is to use the product_category construct in ISO 10303-41 to capture document classification. This resolution follows the document-as-product approach.

SEDS #

Author Glen Ziolko and David Campbell

Author's ziolkgl@mail.northgrum.com or
campbda@mail.northgrum.com

Section 1. GENERAL INFORMATION (completed by SEDS
Coordinator):

SEDS Report Issue Number:

Date Submitted: 6/23/2000

Status and date:

SEDS Team Leader: Ray Goult

SEDS Team Members: David Campbell, Glen Ziolko, WG12 Shape
Representation

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by
author of SEDS Report):

Author: David Campbell and Glen Ziolko

Submitted by: USA

Part/Clause Affected by the Issue: 42 WG12 N415

Other Parts Affected by the Issue: AP that use Part 42

Problem Description: Missing array bounds on return value in FUNCTION
list_to_array and FUNCTION make_array_of_array in the geometry_schema.

Conditions Under Which the Issue Was Discovered: Compiling functions
within

the AP 232 schema using the ECCO compiler on the NIST server.

Proposed Solution (Optional): Add array bounds on return value in the
two FUNCTIONS.

For FUNCTION list_to_array change the line

): ARRAY OF GENERIC:t;

to

): ARRAY[low:u] OF GENERIC:t;

For FUNCTION make_array_of_array change the line

```

): ARRAY OF ARRAY OF GENERIC:t;
to
): ARRAY[low1:u1] OF ARRAY[low2:u2] OF GENERIC:t;

```

Additional Notes:

This is the express that contains the two functions, `list_to_array` and `make_array_of_array` in part 42 WG3 N415.

(* From geometry schema in part 42 - wgl2n415 *)

```

FUNCTION list_to_array(
    lis: LIST [0:?] OF GENERIC:t;
    low, u: INTEGER
): ARRAY OF GENERIC:t;    (* DJC note: ARRAY[low:u] *)

LOCAL
    n    : INTEGER;
    res : ARRAY [low:u] OF GENERIC:t;
END_LOCAL;
n := SIZEOF(lis);
IF n <> ((u - low) + 1) THEN
    RETURN(?);
ELSE
    res := [lis[1],n];
    REPEAT i := 2 TO n BY 1;
        res[(low + i) - 1] := lis[i];
    END_REPEAT;
    RETURN(res);
END_IF;

END_FUNCTION; -- list_to_array

```

```

FUNCTION make_array_of_array(
    lis: LIST [1:?] OF LIST [1:?] OF GENERIC:t;
    low1, u1, low2, u2: INTEGER
): ARRAY OF ARRAY OF GENERIC:t; (* DJC note: ARRAY[low1:u1] OF
ARRAY[low2:u2] *)

    LOCAL
        res : ARRAY [low1:u1] OF ARRAY [low2:u2] OF GENERIC:t;
    END_LOCAL;
    IF ((u1 - low1) + 1) <> SIZEOF(lis) THEN
        RETURN(?);
    END_IF;
    IF ((u2 - low2) + 1) <> SIZEOF(lis[1]) THEN
        RETURN(?);
    END_IF;
    res := [list_to_array(lis[1],low2,u2),(u1 - low1) + 1];
    REPEAT i := 2 TO HIINDEX(lis) BY 1;
        IF ((u2 - low2) + 1) <> SIZEOF(lis[i]) THEN
            RETURN(?);
        END_IF;
        res[(low1 + i) - 1] := list_to_array(lis[i],low2,u2);
    END_REPEAT;
    RETURN(res);

END_FUNCTION; -- make_array_of_array

```

Section 3. RESPONSE INFORMATION(completed by SEDS Team Leader):

This issue was discussed at WG12 Shape Representation meeting in Bordeaux, June 2000. The agreed resolution is to accept the recommended correction. The change will be included in TC3 to part 42 AND in TC1 to part 42 edition 2. note: This particular error was not in the 1994 IS version but was introduced in TC2 when correcting an array initialisation problem. The same error occurs in function make_array_of_array_of_array in edition 2. (To be corrected in TC1)

SEDS #

Author Glen Ziolko and David Campbell

Author's ziolkgl@mail.northgrum.com or
campbda@mail.northgrum.com

Section 1. GENERAL INFORMATION (completed by SEDS
Coordinator):

SEDS Report Issue Number:

Date Submitted: 6/23/2000

Status and date:

SEDS Team Leader: Ray Goult

SEDS Team Members: David Campbell, Glen Ziolko, WG12 Shape
Representation

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by
author of SEDS Report):

Author: David Campbell and Glen Ziolko

Submitted by: USA

Part/Clause Affected by the Issue: 42 WG12 N415

Other Parts Affected by the Issue: AP that use Part 42

Problem Description: Symbolic Constants are not parsed correctly by the EPM and STEPTools Inc Express-X compilers. The particular constant in question is dummy_gri used in the surface_of_revolution entity. Because multiple commercial compilers generated errors while compiling rules using these constants need to verify that this is a legal use.

Conditions Under Which the Issue Was Discovered: Compiling AP 232 containing surface_of_revolution entity with EPM's EXPRESSDataManager and STEPTools Inc. Express-X compilers.

Proposed Solution (1)(Optional): Remove constants and replace with specific string value.

Proposed Solution (2) :EPM and STEPTools enhance compilers to handle symbolic constants in WHERE rules.

Additional Notes:

This is the express out of the geometry_schema that caused an error during compilation in the DERIVE attribute.

(* EPM compiler had problems with the dummy_gri constant *)

```
ENTITY surface_of_revolution
  SUBTYPE OF (swept_surface);
    axis_position : axis1_placement;
  DERIVE
    axis_line : line := dummy_gri || line(axis_position.location,
                                           dummy_gri || vector(axis_position.z,1));
  END_ENTITY; -- surface_of_revolution
```

Section 3. RESPONSE INFORMATION(completed by SEDS Team Leader):

This issue was discussed at WG12 Shape Representation meeting in Bordeaux, June 2000. The agreed resolution is to reject this issue. The usage of the constant dummy_gri is believed to be correct and this constant is used in other parts of the schema without apparently causing compilation problems. The unusual feature of this particular usage is that, because the entity has another subtype of gri as attribute the constant is used twice in creating this instance.

The following are the three SEDS issues based on errors that need correcting in AIC 505, AIC 517, and AIC 518.

Section 1. GENERAL INFORMATION (completed by SEDS Coordinator):

SEDS Report Issue Number:

Date Submitted:

Status and date:

SEDS Team Leader:

SEDS Team Members:

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by author of SEDS Report):

Author: Glen Ziolk

Submitted by: Glen Ziolk

Part/Clause Affected by the Issue: AIC 505 / 4.3.3 Draughting_drawing_revision

Other Parts Affected by the Issue: AP 232

Problem Description: Error in EXPRESS entity Draughting_drawing_revision, Where rule 17. Undefined attribute 'MAPPING_SOURCE' in entity 'REPRESENTATION_MAP' in ROLESOF.

Here is the express with the problem -----> (The problem text is Italic and Bold)

```
ENTITY draughting_drawing_revision
  SUBTYPE OF (drawing_revision);
WHERE
.....
.....
.....
WR17: -- views_contain_one_placement:
  SIZEOF (QUERY (ais <* USEDIN (SELF,
    'AIC_DRAWING_STRUCTURE_AND_ADMINISTRATION.AREA_IN_SET.IN_SET') |
    NOT (SIZEOF (QUERY (mi <* QUERY (item <* ais.area.items |
      ('AIC_DRAWING_STRUCTURE_AND_ADMINISTRATION.MAPPED_ITEM'
      IN TYPEOF(item))) |
      NOT (SIZEOF (QUERY (a2p <* QUERY (pv_item <*
mi.mapping_source.
      mapped_representation.items |

('AIC_DRAWING_STRUCTURE_AND_ADMINISTRATION.AXIS2_PLACEMENT'
  IN TYPEOF(pv_item))) |
  ('AIC_DRAWING_STRUCTURE_AND_ADMINISTRATION.' +
  'REPRESENTATION_MAP.'MAPPING_SOURCE' IN ROLESOF (a2p))
  )) = 1)
  )) = 0)
  )) = 0;
```

Conditions Under Which the Issue Was Discovered: Discovered while compiling AP 232 with the ECCO compiler.

Proposed Solution (Optional): Change 'mapping_source' to 'map_usage'. This will allow the attribute name out of the entity representation_map to be used instead of what that attribute is referenced to. Made this change to schema and recompiled. Warning went away.

Section 1. GENERAL INFORMATION (completed by SEDS Coordinator):

SEDS Report Issue Number:

Date Submitted:

Status and date:

SEDS Team Leader:

SEDS Team Members:

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by author of SEDS Report):

Author: Glen Ziolk

Submitted by: Glen Ziolk

Part/Clause Affected by the Issue: AIC 517tc1 wgl2n968 express/ ENTITY mechanical_design_geometric.presentation_area

Other Parts Affected by the Issue: AP 232 , AP214

Problem Description: Errors in EXPRESS ENTITY mechanical_design_geometric.presentation_area

The errors are the following:

'AIM22.EXP': 3792, 42: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance
'AIM22.EXP': 3796, 38: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance
'AIM22.EXP': 3802, 43: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance
'AIM22.EXP': 3806, 37: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance
'AIM22.EXP': 3810, 38: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance
'AIM22.EXP': 3815, 55: Error : actual parameter passed to 'built-in function parameter' is not a valid entity instance

The entity from the AIC 517 inserted into AP 232 schema is --->

```
3766 ENTITY mechanical_design_geometric.presentation_area
3767 SUBTYPE OF (presentation_area);
3768 WHERE
3769   wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
3770     'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
3771     OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
3772     AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
3773       it1\mapped_item.mapping_source.mapped_representation)))))) ))
3774     = 0);
3775   wr2: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
3776     | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) )
3777     | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
3778       mi1\mapped_item.mapping_source.mapped_representation)) ) | (
```

```

3779 NOT (SIZEOF(QUERY ( it2 <* p\mapped_item.mapping_source.
3780 mapped_representation\representation.items | ((NOT ((
3781 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it2))
3782 OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2))
3783 AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
3784 'CAMERA_IMAGE_3D_WITH_SCALE') IN TYPEOF(it2))) AND (NOT (
3785 'TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(it2\
3786 mapped_item.mapping_source.mapped_representation)))))) OR ((
3787 ('TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')
3788 IN TYPEOF(it2)) AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
3789 'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION')
3790 IN TYPEOF(it2\mapped_item.mapping_source.
3791 mapped_representation)))))) )) = 0)) )) = 0);
3792 wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF\presentation_area,
3793 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
3794 ps.size\planar_extent.size_in_x <= 0) OR (ps.size\
3795 planar_extent.size_in_y <= 0)) )) = 0) AND (SIZEOF(
3796 QUERY ( ais <* USEDIN(SELF\presentation_area,
3797 'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | (SIZEOF(
3798 QUERY ( ps <* USEDIN(ais,'TECHNICAL_DATA_PACKAGING.' +
3799 'PRESENTATION_SIZE.UNIT') | ((ps.size\planar_extent.
3800 size_in_x <= 0) OR (ps.size\planar_extent.size_in_y <= 0)) ))
3801 > 0) )) = 0));
3802 wr4: (((SIZEOF(QUERY ( ps <* USEDIN(SELF\presentation_area,
3803 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
3804 'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
3805 TYPEOF(ps.size.placement)) )) = 1) AND (SIZEOF(
3806 QUERY ( ps <* USEDIN(SELF\presentation_area,
3807 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
3808 'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
3809 TYPEOF(ps.size.placement)) )) = 0)) OR ((SIZEOF(
3810 QUERY ( ais <* USEDIN(SELF\presentation_area,
3811 'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | (SIZEOF(
3812 QUERY ( ps <* USEDIN(ais,'TECHNICAL_DATA_PACKAGING.' +
3813 'PRESENTATION_SIZE.UNIT') | (('TECHNICAL_DATA_PACKAGING.' +
3814 'AXIS2_PLACEMENT_2D') IN TYPEOF(ps.size.placement)) )) = 1) ))
3815 = 1) AND (SIZEOF(QUERY ( ais <* USEDIN(SELF\
3816 presentation_area,'TECHNICAL_DATA_PACKAGING.' +
3817 'AREA_IN_SET.AREA') | (SIZEOF(QUERY ( ps <* USEDIN(ais,
3818 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
3819 'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
3820 TYPEOF(ps.size.placement)) )) = 0) )) = 1)))));
3821 END_ENTITY; -- mechanical_design_geometric_presentation_area

```

Conditions Under Which the Issue Was Discovered: Discovered while compiling AP 232 long form on the ECCO compiler.

Proposed Solution (Optional):

There are two proposed solutions. One proposal is contained in AP214 currently, which uses the entity `mechanical_design_geometric_presentation_area`. This entity in AP 214 is different than the AIC 517 entity, by the removal of the text '`\presentation_area`' in 6 places. These 6 places correspond to the six places the errors showed up. The second proposed solution contains the same changes as the first proposal but also adds '`('TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ps)) AND '` ' to the express in 3 places and '`('TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ais)) AND '` ' to the express in 3 other places. Len Slovensky came up with this second proposal.

The second proposal express follows with the changes identified with --LWS modified

This express was pulled from AP 232 with AIC 517 incorporated.

ENTITY `mechanical_design_geometric_presentation_area`

SUBTYPE OF (`presentation_area`);

WHERE

```
wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
    'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
    OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
    AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
    it1\mapped_item.mapping_source.mapped_representation)))))) )
    = 0);
```

```
wr2: (SIZEOF(QUERY ( pv <* QUERY ( mil <* QUERY ( it1 <* SELF.items
    | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
    | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
    mil\mapped_item.mapping_source.mapped_representation)) ) | (
    NOT (SIZEOF(QUERY ( it2 <* pv\mapped_item.mapping_source.
    mapped_representation\representation.items | ((NOT ((
    'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it2))
    OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2))
    AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
    'CAMERA_IMAGE_3D_WITH_SCALE') IN TYPEOF(it2))) AND (NOT (
    'TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(it2\
    mapped_item.mapping_source.mapped_representation)))))) ) OR ((
    ('TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')
    IN TYPEOF(it2)) AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
    'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION')
    IN TYPEOF(it2\mapped_item.mapping_source.
    mapped_representation)))))) ) = 0)) ) = 0);
```

```

wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF,
    'TECHNICAL_DATA_PACKAGING.PRESENTATION_SIZE.UNIT') |
    (( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ps))
AND --- LWS modified
    (ps.size\planar_extent.size_in_x <= 0) OR (ps.size\
    planar_extent.size_in_y <= 0)) )) = 0) AND (SIZEOF(
    QUERY ( ais <*
USEDIN(SELF, 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.AREA') |
    ( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ais))
AND --- LWS modified
    (SIZEOF(QUERY ( ps <* USEDIN(ais, 'TECHNICAL_DATA_PACKAGING.' +
    'PRESENTATION_SIZE.UNIT') | ((ps.size\planar_extent.
    size_in_x <= 0) OR (ps.size\planar_extent.size_in_y <= 0)) ))
    > 0) )) = 0));
wr4: (((SIZEOF(QUERY ( ps <* USEDIN(SELF,
    'TECHNICAL_DATA_PACKAGING.PRESENTATION_SIZE.UNIT') |
    ( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ps))
AND --- LWS modified
    (('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
    TYPEOF(ps.size.placement)) )) = 1) AND (SIZEOF(
    QUERY ( ps <* USEDIN(SELF,
    'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') |
    ( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ps))
AND --- LWS modified
    (('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
    TYPEOF(ps.size.placement)) )) = 0)) OR ((SIZEOF(
    QUERY ( ais <* USEDIN(SELF,
    'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') |
    ( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ais))
AND --- LWS modified
    (SIZEOF(QUERY ( ps <* USEDIN(ais, 'TECHNICAL_DATA_PACKAGING.' +
    'PRESENTATION_SIZE.UNIT') | (('TECHNICAL_DATA_PACKAGING.' +
    'AXIS2_PLACEMENT_2D') IN TYPEOF(ps.size.placement)) )) = 1) ))
    = 1) AND (SIZEOF(QUERY ( ais <* USEDIN(SELF,
    'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.AREA') |
    ( 'TECHNICAL_DATA_PACKAGING.PRESENTATION_AREA' IN TYPEOF(ais))
AND --- LWS modified
    (SIZEOF(QUERY ( ps <* USEDIN(ais,
    'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
    'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
    TYPEOF(ps.size.placement)) )) = 0) )) = 1))) ;
END_ENTITY; -- mechanical_design_geometric_presentation_area

```

Additional Notes:

Section 1. GENERAL INFORMATION (completed by SEDS Coordinator):

SEDS Report Issue Number:

Date Submitted:

Status and date:

SEDS Team Leader:

SEDS Team Members:

Section 2. ENHANCEMENT AND DISCREPANCY INFORMATION (completed by author of SEDS Report):

Author: Glen Ziolk

Submitted by: Glen Ziolk

Part/Clause Affected by the Issue: AIC 518 WG12n627 express/ ENTITY
mechanical_design_shaded_presentation_area

Other Parts Affected by the Issue: AP 232

Problem Description: Errors in EXPRESS ENTITY
mechanical_design_shaded_presentation_area,

The errors are the following:

'AIM22.EXP': 4054, 37: Error : attribute 'items' not declared in
partial type 'presentation_view'
'AIM22.EXP': 4092, 37: Error : attribute 'items' not declared in
partial type 'presentation_view'
'AIM22.EXP': 4097, 62: Error : attribute 'mapping_source' not declared
in partial type 'camera_image_3d_with_scale'

The entity from the AIC as used in AP 232 is --->

```
4040 ENTITY mechanical_design_shaded_presentation_area
4041 SUBTYPE OF (presentation_area);
4042 WHERE
4043   wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
4044     'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
4045     OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
4046     AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
4047     it1\mapped_item.mapping_source.mapped_representation)))))) ))
4048   = 0);
4049   wr2: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
4050     | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) ) )
```

```

4051 | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
4052 mi1\mapped_item.mapping_source.mapped_representation)) ) | (
4053 NOT (SIZEOF(QUERY ( it2 <* pv\mapped_item.mapping_source.
4054 mapped_representation\presentation_view.items | ((NOT ((
4055 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it2))
4056 OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2))
4057 AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
4058 'CAMERA_IMAGE_3D_WITH_SCALE') IN TYPEOF(it2))) AND (NOT (
4059 'TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(it2\
4060 mapped_item.mapping_source.mapped_representation)))))) OR ((
4061 ('TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')
4062 IN TYPEOF(it2)) AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
4063 'MECHANICAL_DESIGN_SHADED_PRESENTATION_REPRESENTATION') IN
4064 TYPEOF(it2\mapped_item.mapping_source.mapped_representation))
4065 ))) ) = 0)) ) = 0);
4066 wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.'
4067 + 'PRESENTATION_SIZE.UNIT') | (NOT ((ps.size\planar_extent.
4068 size_in_x > 0) AND (ps.size\planar_extent.size_in_y > 0))) ) )
4069 = 0) AND (SIZEOF(QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
4070 'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
4071 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
4072 ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
4073 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
4074 NOT ((psize.size\planar_extent.size_in_x > 0) AND (psize.
4075 size\planar_extent.size_in_y > 0))) ) ) = 0)) ) = 0);
4076 wr4: ((SIZEOF(QUERY ( psize <* USEDIN(SELF,
4077 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
4078 'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
4079 TYPEOF(psize.size.placement)) ) ) = 1) AND (SIZEOF(
4080 QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
4081 'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
4082 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
4083 ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
4084 'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
4085 NOT (('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
4086 TYPEOF(psize.size.placement))) ) ) = 0)) ) = 0);
4087 wr5: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
4088 | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) )
4089 | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
4090 mi1\mapped_item.mapping_source.mapped_representation)) ) | (
4091 NOT (SIZEOF(QUERY ( ci <* pv\mapped_item.mapping_source.
4092 mapped_representation\presentation_view.items | (((
4093 'TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')

```

```

4094      IN TYPEOF(ci)) AND (SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
4095      'CAMERA_MODEL_D3','TECHNICAL_DATA_PACKAGING.' +
4096      'CAMERA_MODEL_D3_WITH_HLHSR','TECHNICAL_DATA_PACKAGING.' +
4097      'CAMERA_MODEL_WITH_LIGHT_SOURCES'] * TYPEOF(ci\
4098      camera_image_3d_with_scale.mapping_source.mapping_origin)) =
4099      1))) = 0))) = 0);
4100 END_ENTITY; -- mechanical_design_shaded_presentation_area

```

Conditions Under Which the Issue Was Discovered: Discovered while compiling AP 232 long form on the ECCO compiler.

Proposed Solution (Optional): Len Slovensky proposed the following changes which removed the error condition.

Changes made in following express and identified with --LWS comments

This express was pulled from AP 232 with AIC 518 incorporated.

```

ENTITY mechanical_design_shaded_presentation_area
  SUBTYPE OF (presentation_area);
  WHERE
    wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
      'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
      OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
      AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
        it1\mapped_item.mapping_source.mapped_representation)))))) ))
      = 0);

    wr2: (SIZEOF(QUERY ( pv <* QUERY ( mil <* QUERY ( it1 <* SELF.items |
      ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) ) |
      ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW'
                                                                    I N
      TYPEOF(mil\mapped_item.mapping_source.mapped_representation)) ) |
                                                                    ( NOT (SIZEOF(QUERY ( it2 <*
pv\mapped_item.mapping_source.mapped_representation\representation.items |
      (('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(pv))
AND      --- LWS these two lines modified
      (NOT (('TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN
      TYPEOF(it2))
      OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2)) AND
      (NOT (('TECHNICAL_DATA_PACKAGING.CAMERA_IMAGE_3D_WITH_SCALE')
IN TYPEOF(it2)))) AND
      (NOT ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW'
                                                                    I N
      TYPEOF(it2\mapped_item.mapping_source.mapped_representation)))))) OR
      (( ('TECHNICAL_DATA_PACKAGING.CAMERA_IMAGE_3D_WITH_SCALE') IN
      TYPEOF(it2)) AND

```

```

( N O T
(('TECHNICAL_DATA_PACKAGING.MECHANICAL_DESIGN_SHADED_PRESENTATION_REPRESENTATI
ON'))
I N
TYPEOF(it2\mapped_item.mapping_source.mapped_representation))
))) )) = 0)) )) = 0);

wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF, 'TECHNICAL_DATA_PACKAGING.'
+ 'PRESENTATION_SIZE.UNIT') | (NOT ((ps.size\planar_extent.
size_in_x > 0) AND (ps.size\planar_extent.size_in_y > 0))) ))
= 0) AND (SIZEOF(QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
NOT ((psize.size\planar_extent.size_in_x > 0) AND (psize.
size\planar_extent.size_in_y > 0))) )) = 0) )) = 0));
wr4: ((SIZEOF(QUERY ( psize <* USEDIN(SELF,
'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
TYPEOF(psize.size.placement)) )) = 1) AND (SIZEOF(
QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
NOT (('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
TYPEOF(psize.size.placement))) )) = 0) )) = 0));
wr5: (SIZEOF(QUERY ( pv <* QUERY ( mil <* QUERY ( it1 <* SELF.items |
('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) ) |
('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
mil\mapped_item.mapping_source.mapped_representation)) ) | (
NOT (SIZEOF(QUERY ( ci <*
pv\mapped_item.mapping_source.mapped_representation\representation.items |
(('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(pv))
AND --- LWS these two lines modified
(('TECHNICAL_DATA_PACKAGING.CAMERA_IMAGE_3D_WITH_SCALE') IN
TYPEOF(ci)) AND
(SIZEOF([
'TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_D3',
'TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_D3_WITH_HLHSR',
'TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_WITH_LIGHT_SOURCES'] *
TYPEOF
(ci\mapped_item.mapping_source.mapping_origin)) =
--- LWS remove camera_image_3d_with_scale

```



```
1)) )) = 0)) )) = 0);  
END_ENTITY; -- mechanical_design_shaded_presentation_area
```

Additional Notes: